

REMARKS

After entry of this amendment, claims 1, 2, 4, 5, 7, 9 – 10, 14 – 19, 22 – 24, 76, 78, 80, 82 – 83, and 88 – 108 will be pending.

Claim 1 has been amended to delete the reference to alkaline-soluble resins and inorganic adhesives. Claims 4 and 82 have been amended to clarify the scope of the claims. Support for the amendments may be found, for example, in the originally filed claims as well as in the originally filed patent application, as indicated in paragraphs [0075] – [0077] of the published patent application.

New independent claim 88 has been added; claim 88 includes all of the limitations of claim 1, other than that the adhesive particulate material may include a water-soluble resin. Rather, claim 88 recites the adhesive particulate material limitations formerly recited in cancelled claims 11 and 13, i.e., specific alkaline-soluble resins and inorganic adhesives. Accordingly, claims 11 and 13 have been cancelled. Dependent claims 89 – 104, depending from claim 88 and analogous to dependent claims 2, 4, 5, 7, 9, 10, 11, 13 – 19, and 22 – 24, have been added.

Original dependent claims 77, 79, and 81 (that were previously cancelled) have been reintroduced as new claims 105 – 107. New claim 108 has been added, further limiting the composition of the adhesive particulate material recited in claim 83.

Support for the amendments and the new claims may be found, for example, in the originally filed claims. No new matter has been added.

Telephone conference with Examiner

The undersigned thanks the Examiner for her time and courtesy in discussing a strategy for responding to the final Office action during a telephone conference on October 8, 2008. The amendments and remarks herein incorporate suggestions made by the Examiner during the conference. This paper presents Applicants' complete written statement under 37 C.F.R. § 1.133.

Rejection of claims under 35 U.S.C. § 102

Independent claim 82 is rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,780,368 to Liu et al. ("Liu"). Liu appears to describe a freeform fabrication method for fabricating a 3-D multi-material or multi-color object from successive layers of a primary body-building powder.

The Examiner relies on Liu to teach all of the elements of independent claim 82. In the Amendment and Response filed January 3, 2008, Applicants explained that Liu does not apply at least one of an ultraviolet light, a visible light, or an electron beam on the printed layer to induce a non-aqueous fluid to solidify, as required by claim 82. Also, Liu does not seem to teach or suggest applying a non-aqueous fluid to activate thermoplastic particles and thereafter applying an energy source to induce the non-aqueous fluid to solidify, as also recited in claim 82. Rather, Liu appears to disclose applying an energy source to either cure or harden a powder including a resin composition or to fuse a lower-melting material to become a liquid that is subsequently cooled to become a solid. *See* column 7, lines 8–17.

In the instant Office action, apparently relying on language in column 19 of Liu, the Examiner states that Liu discloses applying energy means to fuse the binder powder, allowing the resulting fused binder fluid to permeate downward through the particles. The Examiner further states that once permeated through a layer of powder, the binder fluid can be cooled down and solidified.

This characterization of Liu actually underscores the differences between Liu and claim 82. In other words, the Examiner explains that Liu first creates a binder fluid by applying energy means, and then solidifies the material by cooling the temperature. In stark contrast, claim 82 requires first applying a fluid to a film of particles and then applying an energy means to induce the fluid to solidify.

Moreover, Liu does not teach or suggest applying a non-aqueous fluid to a film of particles. Rather, Liu selectively deposits a binder powder image and then fuses it with a UV source. *See* Figure 3 of Liu and related text,

In summary, claim 82 requires (i) applying a non-aqueous fluid to a film of particles and (ii) thereafter applying an energy source to induce the non-aqueous fluid to solidify. Liu discloses applying an energy source to either (i) cure or harden a powder including a resin composition or (ii) to fuse a material to form a liquid that is subsequently cooled to become a solid. *See* column 7, line 8 –17. The Examiner herself characterizes Liu as first creating a binder fluid by applying energy means and then solidifying the binder material by cooling the temperature. In stark contrast, claim 82 requires first applying a fluid to a film of particles and then applying an energy means to induce the fluid to solidify.

Applicants respectfully submit that amended independent claim 82 is patentable over the cited art for at least these reasons.

Claims 76, 78, 80, and 83 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,649,077 to Lauchenauer (“Lauchenauer”). Lauchenauer appears to disclose a heat activatable adhesive formed from at least two components, each in the form of discrete flowable particles. *See abstract of Lauchenauer.* An auxiliary agent may be incorporated, the agent being capable of strongly swelling or even dissolving at least one of the interacting components, this auxiliary agent being released or activated only when proper heat and/or pressure is applied to the conglomeratic material. *See column 5, lines 20 – 25, emphasis added.* The Examiner relies on Lauchenauer to teach all of the limitations of independent claims 76, 78, 80, and 83. The Examiner states that, as mentioned above, an auxiliary agent may dissolve at least one of the interacting components of a heat activatable adhesive. The Examiner apparently considers that this mechanism is equivalent to applying a fluid to a loose and free-flowing particulate mixture, as required by the instant claims.

Lauchenauer does not teach or suggest, however, applying a fluid to a film of a loose and free-flowing particulate mixture, as recited in independent method claims 76, 78, and 80. Similarly, Lauchenauer does not disclose an article that is a product of a loose and free-flowing particulate mixture and a fluid, as recited in independent article claim 83. Rather, Lauchenauer forms a heat activatable sheet from discrete flowable particles and subsequently activates a component by heat and/or pressure, not a fluid, to activate a component in the sheet. *See column 3, line 13 – 40.* At the point at which the component is activated, it is adhered to the heat activatable sheet and is no longer flowable. Thus, Lauchenauer does not and cannot disclose applying a fluid to a loose and free-flowing mixture, as required by the instant claims.

Moreover, Lauchenauer teaches away from the use of fluids for binding materials. Lauchenauer appears to mention fluids only with respect to the prior art, in the context of liquid adhesives being used to join two layers of a composite sheet material. *See column 1, lines 13–16.* Lauchenauer lists a number of problems associated with such bonding systems, such as the challenge in removing liquid media by evaporation while holding the objects to be joined tightly together. *See column 1, lines 17 – 20, of Lauchenauer.*

There appears, therefore, to be an error in the use of this reference against independent method claims 76, 78, and 80, that each recite applying fluid to a loose and free-flowing particulate material. Similarly, there appears to be an error in the rejection of independent article claim 83 in view of Lauchenauer, as Lauchenauer does not disclose an article including the product of a loose and free-flowing particulate mixture and a fluid, as required by claim 83.

Applicants submit that claims 76, 78, 80, and 83, as well as claims dependent therefrom, are patentable for at least these reasons.

Claims 1, 2, 4, 5, 7, 9 – 11, 13 – 19, and 22 – 24 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,061,825 to Counsell et al. (“Counsell”). Counsell appears to disclose a water-activatable tape including a substrate impregnated or coated with a water-reactive cementitious composition that includes a water-sensitive additive. In a dry state of the tape, a binder binds dry cement particles to the tape. *See abstract and column 1, lines 40 – 65.* Suitable binders include organic polymeric materials. *See column 1, line 67.*

The Examiner relies on Counsell to teach all of the limitations of independent claim 1. Counsell, however, does not teach or suggest a loose and free-flowing particulate mixture including a thermoplastic particulate material and an adhesive particulate material, as required by independent claim 1. Rather, Counsell discloses a cementious composition that may include one cement, a non-water-sensitive polymeric binder, and a water-sensitive additive. *See column 1, lines 40 – 50,* of Counsell. A cementious composition applied to a tape is neither a loose nor a free-flowing particulate mixture.

Moreover, Counsell’s composition do not include a thermoplastic material, as required by claim 1. Obviously, neither the cement nor the water-sensitive additive disclosed by Counsell is a thermoplastic material. The polymeric binder disclosed by Counsell is also not a thermoplastic particulate material of the type recited in claim 1. In particular, the polymeric binder of Counsell may be a natural or synthetic rubber, as well as certain classes of non-rubbery polymers. *See column 1, line 67 – column 2, line 21.* None of these materials is a thermoplastic of the type recited in claim 1, i.e., none of the materials described in Counsell is acetal polyoxymethylene, polylactide, ethylene vinyl acetate, polyphenylene ether, ethylene-acrylic acid copolymer, polyether block amide, polyvinylidene fluoride, polyetherketone, polybutylene terephthalate, polyethylene terephthalate, polycyclohexylenemethylene terephthalate, polyphenylene sulfide, polythalamide,

polymethylmethacrylate, polysulfones, polyethersulfones, polyphenylsulfones, polyacrylonitrile, poly(acrylonitrile-butadiene-styrene), polyamides, polystyrene, polyolefin, polyvinyl butyral, polycarbonate, polyvinyl chlorides, ethyl cellulose, cellulose acetate, or cellulose xanthate. Thus, Counsell does not teach or suggest a mixture of a thermoplastic particulate material and an adhesive particulate material that comprises a water-soluble resin including at least one of sulfonated polyester polymer, sulfonated polystyrene, polyethylene oxide, butylated polyvinylpyrrolidone, polyvinyl alcohol-co-vinyl acetate, cationic starch, pregelatinized cationic starch, or combinations or copolymers thereof, as required by amended claim 1.

Applicants submit that claim 1, as well as claims dependent therefrom, are patentable for at least these reasons.

New independent claim 88 is analogous to claim 1, except that the adhesive particulate material selected from the group consisting of (i) an inorganic adhesive including at least one of magnesium phosphate cement, magnesium oxychloride cement, magnesium oxysulfate cement, zinc phosphate cement, zinc oxide – eugenol cement, or combinations thereof, and (ii) an alkaline-reducible resin including at least one of octylacrylamide/acrylate/ butylaminoethyl methacrylate copolymer, acrylates/octylacrylamide copolymer, styrenated polyacrylic acid, or combinations or copolymers thereof. Counsell does not teach or suggest any of these materials, alone or in the recited combination. Applicants note that the only cement disclosed by Counsell is Portland cement, a material that is not recited in the instant claims.

Applicants submit that claim 88 and claims dependent therefrom, are patentable for at least this reason, as well as the reasons for which claim 1 is also patentable.

CONCLUSION

In light of the foregoing, Applicants respectfully submit that all claims are now in condition for allowance.

Enclosed are a Request for Continued Examination, a Petition for a One-Month Extension of Time, and authorization to charge the request fee of \$940.00 to Deposit Account No. 07-1700. Applicants believe that no additional fees are necessitated by the present paper. However, in the event that any additional fees are due, the Commissioner is hereby authorized to charge any such fees to Deposit Account No. 07-1700.

If the Examiner believes that a telephone conversation with Applicants' attorney would expedite allowance of this application, the Examiner is cordially invited to call the undersigned attorney at (617) 570-1806.

Respectfully submitted,

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